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AUTHOR Daniel, Larry G.
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ABSTRACT

This paper demonstrates how Q-methodology combines artistic and scientific procedures to allow social science researchers to develop and test theories about differences in persons. Q-methodology is based on factor analysis. In R-technique factor analysis, the most commonly used technique, variables define the columns and persons define the rows of the raw data matrix used to create the factored matrix of associations. In Q-technique factor analysis, the same two dimensions are used, although they are reversed. Q-methodology has sometimes been referred to as transposed analysis or inverse analysis. Because it is based on theoretically driven assumptions and computed using complex factor analytic procedures, Q-analysis serves as a fine example of the science of research, but its focus on small samples, intra-individual attitudes, and the researcher's creativity in identifying the emergent person factors yielded by the analysis make it a highly artistic technique as well. Over 1,500 studies using Q-methodology can be found in the social science literature. Its contribution to behavioral research has been recognized. One figure gives an example of an unnumbered graphic scale, and a 57-item list of references is included. (SLD)

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Q-METHODOLOGY: AN OVERVIEW WITH COMMENTS RELATIVE TO ARTISTIC AND SCIENTIFIC ELEMENTS OF EDUCATIONAL RESEARCH

Larry G. Daniel

University of Southern Mississippi

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ABSTRACT

In keeping with the theme of the 1993 annual meeting of the American Educational Research Association, "The Art and Science of Educational Research and Practice," the purpose of this paper was to demonstrate how Q-methodology combines both artistic and scientific procedures to allow social science researchers to develop and test theories about differences in persons. The paper is tutorially focused, offering a straightforward, non-technical discussion of Q-methodology. The author shows how Q-analysis is similar to other forms of intraindividual analysis, including the Thurstone stimulus centered method, F-sorting, multidimensional scaling analysis and R-technique factor analysis. Finally, a detailed discussion of the artistic and scientific characteristics of Q-methodology is offered.

Q-METHODOLOGY: AN OVERVIEW WITH COMMENTS RELATIVE TO ARTISTIC AND SCIENTIFIC ELEMENTS OF EDUCATIONAL RESEARCH

The purpose of this paper is to discuss the merits of Q-methodology as a viable research tool for the social scientist, focusing particularly on both the artistic and scientific elements of the technique. Organizationally, the paper is divided into three major sections. First, a general introduction to Q-methodology is offered, including references to works that explain the logic of Q-methodology as well as to actual studies that have employed Q-methodology. Second, Q-methodology is compared and contrasted with several similar methods for analyzing intraindividual differences, including the Thurstone stimulus centered method, F-sort categorization analysis, multidimensional scaling analysis, and R-technique factor analysis. Finally, a brief discussion of the artistic and scientific characteristics of Q-methodology is provided.

Introduction to Q-Methodology

An appropriate introduction to Q-methodology requires an introduction to factor analysis, the statistical procedure on which Q-methodology is based. Factor analysis has been defined as ". . .a variety of statistical techniques whose common objective is to represent a set of variables [or other factored entities] in terms of a smaller number of hypothetical variables" (Kim & Mueller, 1978, p. 9). Considering its usefulness in the social sciences, factor analysis has been described as "one of the most powerful tools yet devised for the study of complex areas of behavioral scientific concern" (Kerlinger, 1986, p. 689), and as "the furthest logical development and reigning queen of the correlational methods" (Cattell, 1978, p. 4). All factor analytic techniques are based upon matrices of association (i.e., correlation matrices) among all variables or other factored entities (e.g.,

persons, occasions of measurement) within a given data set. In any given factor analytic procedure, the identified matrix of association is statistically analyzed, and factors are extracted (and often rotated) which maximally account for the interrelationships among the factored entities (Kerlinger, 1986).

Social scientists (e.g., Cattell, 1952, 1988; Rummel, 1970) have conceived of a three-dimensional model (often referred to as a "data box" or "data cube") for measuring and describing any given psychological or ideological phenomenon. These three dimensions (called modes) are generally considered to be persons, variables, and occasions of measurement (Cattell, 1952, 1988). Factor analytical techniques usually involve two of these three modes, one of which is factored across the other. In R-technique factor analysis, the most commonly-used technique, variables define the columns and persons define the rows of the raw data matrix used to create the factored matrix of associations. In Q-technique factor analysis, the most commonly-used alternative to R-technique, the same two dimensions are used although they are reversed (Comrey & Lee, 1991). Consequently, Q-technique factor analysis has sometimes been referred to as "transposed" analysis (Nunnally, 1967) and as "inverse analysis" (Comrey & Lee, 1991), although these labels do not necessarily always give an accurate perception of the logic underlying Q-methodology (McKeown & Thomas, 1988).

R-technique factor analytic methods are frequently used to identify which items within a data set effectively identify or measure certain theoretical constructs. Hence, Daniel (1990a, p. 1) notes that R-technique factor analysis is useful "both in theory development and in the validation of measures of human behaviors and abilities." Q-

methodology, on the other hand, provides for the grouping or clustering of individuals according to the similarity of their subjective responses on a given set of variables (Stephenson, 1935, 1953), offering information about prototypes of individuals who respond in certain ways to given stimuli.

Overview of Q-Methodology

Q-methodology refers to a family of philosophical, psychological, psychometric, and statistical ideas for conducting research on individuals (Kerlinger, 1986). Although usually credited to William Stephenson (1935, 1953), Q-methodology has its roots in the early "stimulus-centered" scales proposed by Thurstone and Chave (1929). As described by Dawis (1987) the "stimulus-centered" or "Thurstone" method involves creating a large number of statements about a construct, having a number of judges sort the statements and assign a numerical scale value to each of the items based on the judges' degree of feeling about the items, and selecting out those items for inclusion on a final version of the instrument which have the least variability across the ratings of the judges.

Q-methodology is a useful statistical technique when a researcher wishes to identify or confirm the existence of person-prototypes or certain groups of subjects (or "persons factors"--Kerlinger, 1979) who respond differently from others (Lorr, 1983). For example, Thompson (1980a) used Q-methodology to identify distinct clusters of persons relative to a set of items designed to distinguish different orientations of educational evaluators, Aitken (1988) used the technique to identify various clusters of

persons relative to their attitudes toward music videos, Daniel (1991; Daniel & Blount, in press) used it along with R-technique to develop instrumentation for determining the orientations of middle school teachers relative to their schools' organizational culture, Daniel and Ferrell (1991) and (DeVille, 1992), respectively, used it to investigate the career motivation of persons entering teaching and educational administration, and Carr (1989b) used it to cluster special education students based on a teacher's ratings of the students on a series of pupil appraisal criteria.

Besides serving as a method for categorizing people based on common responses, Q-methodology may also be used in single-subject research as it allows the researcher to assess characteristics of persons across various life stages or episodes or to build "whole person" profiles based on persons' self-reported "ideal" and "typical" selves (Heinemann & Shontz, 1985). Hence, Q-methodology is frequently referred to as a technique for assessing "human subjectivity," i.e., "a person's point of view on any matter of personal and/or social importance" (McKeown & Thomas, 1988, p. 7), even though it is also possible to analyze group responses via Q-methodology (Taylor, Thompson, & Bogotch, 1992).

In employing Q-methodology, individuals are generally asked to rank order a series of items (referred to as the "Q-sample") according to some predetermined criterion. The most commonly used technique for collecting the data for Q-technique factor analysis is the Q-sort. The most common Q-sort strategy, which has been termed the "conventional-sorting strategy" (Thompson, 1980b) has been described by Kerlinger (1979):

> . . . the Q-sort [is] a deck of from 40 to about 100 cards on which items are typed or otherwise depicted. (Drawings and abstract figures, for example, have been used.) Individuals are instructed to sort the cards into six to ten or even more piles according to various criteria: like-dislike, approval-disapproval, like me-not like me, and so on. Different values are assigned to each pile--usually 0 through 7, 8, 9, or 10--and these numbers are used to intercorrelate the sets of responses of different individuals with each other. [p. 200]

As an alternative to physically sorting the items into piles, some researchers (e.g., Aitken, 1988; Aitken & Palmer, 1988; Ferrell & Ferguson, 1993; Johnson, 1992, 1993) have respondents write the numbers associated with each item onto spaces on a paper grid.

The Q-sample (i.e., the items, pictures, or other stimuli) may be classified as either "naturalistic" or "ready-made," and as either "structured" or "unstructured" (McKeown & Thomas, 1988). Naturalistic Q-samples are derived from the oral or written responses of individuals included in a Q-methodology study, while ready-made samples are based on information gained from other sources external to the study. Structured Q-samples consist of items developed around the constructs identified in a theory or ordered system of knowledge about a phenomenon, with adequate representation of each construct reflected in the items; unstructured samples more loosely reflect the content of a domain, "without undue effort made to ensure coverage of all possible sub-issues" of the domain (McKeown & Thomas, 1988, p. 28).

Generally, it is recommended that the sorter be instructed to sort the cards so as to obtain a normal or quasi-normal distribution (Kerlinger, 1986). In other words, once the stack of cards is sorted, the extreme piles will normally contain few cards, while the piles nearer the middle of the attitudinal continuum will contain more cards. As an alternative to the use of a quasi-normal distribution, some Q-sorts have incorporated a rectangular distribution, i.e., a distribution in which each pile of cards contains an equivalent or nearly equivalent number of cards. Kerlinger (1986) has argued that the use of a quasi-normal distribution in Q-sorts is generally superior due to various statistical properties of such a distribution; although Brown (1985) presents evidence to suggest that the distribution shape has little effect on the results. However, Thomas and McKeown (1988, p. 34) note that use of the quasi-normal distribution is in keeping with the "Law of Error" which assumes "that fewer issues are of great importance than issues of less or no significance.

Once the subjects are factored across the items, the resultant person factors are then examined for interpretability based on the factor scores of the persons in each identifiable factor. As Brown (1986, p. 60) has noted:

> The result [of the Q factor analysis] is a single Q sort (factor array) for each factor, with each factor array being a composite of those individual Q sorts constituting the factor. If ten persons share a common outlook, for example, then they will be highly intercorrelated, they will define a factor together, and the merger of their separate responses will result in a single Q sort representing the view they hold in common. . . .

> Ultimately, the [researcher's] task is to interpret and explain the similarities and differences among these factor arrays.

One of the major shortcomings of the conventional Q-methodology data collection procedure is that the sorting procedure throws away information about differences among the items included within a given category (Thompson, 1980b). For instance, all of the cards sorted into an ipsative category termed "most unlike me" would be assigned the same value despite the fact that the sorter may not necessarily feel equally about each of the items. To remedy this problem, Thompson (1980b) recommended a "mediated-ranking procedure" in which all of the cards sorted according to the conventional procedure are then rank-ordered within each given category. Once these rank-ordered cards are hierarchically aggregated by categories, the items will be fully rank ordered, and therefore each card can receive a unique ranking. Ferrell and Ferguson (1993) demonstrate this procedure in a Q-methodology study of academic misconduct among graduate students in education at a selected institution of higher education.

Although the mediated ranking approach to collecting Q-methodology data is superior to the conventional approach, it requires a rather lengthy commitment of time on the part of the subject. A more time-economic alternative has been suggested by Thompson (1981) and empirically employed in studies by Townsend (1987), Carr (1989a), and Daniel (Daniel, 1990b; Daniel & Ferrell, 1991). This technique, termed the "unnumbered graphic scale," (Thompson, 1981) consists of an unnumbered continuum between two bipolar adjectives or descriptors (e.g., "agree" and "disagree"; "most like

me" and "least like me"). An example of this response format is shown in Figure 1. Subjects are instructed to read each item and respond by placing a vertical line through the continuum at the point which best represents their opinion on the item. When scoring items, the scorer can divide the continuum into more or fewer scale steps based on the amount of variance in scores that is desired.

INSERT FIGURE 1 ABOUT HERE

Another advantage of this procedure is that subjects' ratings of the items may be easily converted to item rankings with the leftmost mark receiving a rating of one and the rightmost mark receiving a rating equivalent to the number of items on the instrument. Hence, when comparing this unnumbered scale to traditional numeric Likert-type scales, it can be concluded that the unnumbered scale allows for scoring of items including more score steps resulting in larger standard deviations, higher reliabilities of items, and ultimately greater reliability of factors (Daniel, 1989; Thompson, 1981).

Comparison of Q-Methodology with Other Similar Techniques

Q-methodology and other factor analytic techniques fall into a broad category of methods that have been referred to as "data-reduction techniques" (Berven & Scofield, 1982). These techniques include not only factor analytic procedures (e.g. R-methodology, Q-methodology), but a host of other methods as well: multidimensional scaling, cluster analysis, classification methodologies (e.g., F-sorting), and Thurstone

"stimulus centered" scaling, to name a few. These techniques share certain similarities, most notably that they are all based on some type of similarity matrix which indicates "the degree of relationship between every pair of variables [or other entities] within the set" (Berven & Scofield, 1982, p. 299). Although a comparison of all these methods is beyond the scope of the present discussion, comparisons of Q-methodology with R-methodology, multidimensional scaling analysis, Thurstone stimulus centered scaling, and F-sort procedures are briefly addressed. Comparisons might also be made between Q-technique and (a) cluster analysis (Tryon & Bailey, 1970), (b) conventional rating data (Block, 1961), (c) paired comparison methodology (Guilford, 1954), (d) co-citation analysis (Noma, 1984), and various ipsative data analytic procedures (McLean & Chissom, 1986).

Comparison with R-Methodology

As previously noted, Q-methodology has often been referred to as the inverse of R-technique factor analysis, although McKeown and Thomas (1988) suggest that this comparison is not always appropriate. Obviously, differences exist in the entity which is being factored across the two methods as well as (more often than not) the data collection procedures employed. Beyond these basic methodological differences, however, McKeown and Thomas (1988, pp. 22-24) also note several philosophical issues that separate Q- from R-methodology. For example, the authors note that Q, unlike R, does not begin study of a given phenomenon with an a priori definition of the phenomenon established apart from the respondent's own subjective self-reference.

While R allows the researcher to align subjects along a continuum (and ultimately to categorize the subjects) based on their scores on a validated set of items, Q allows for individual definition of a given phenomenon based on the subjects' own attitudes and experiences.

Consequently, as regards research contextuality, Q-methodology is regarded as a method of impression as opposed to a method of expression, appealing to an internal rather than external point of view. As Stephenson (1953, p. 340) noted, R-methodology focuses on "individual differences" across persons while Q-methodology focuses on the "intra-individual significance" of subjects' understanding of research stimuli. These distinctions do not necessarily make Q either superior or inferior to R, but merely demonstrate that the two methodologies are useful for different types of inquiries: "Generally speaking, when capabilities or objective behavioral performances are at issue--as in the customary study of intelligence for example--methods of expression [e.g., R-technique] are in order. When the focus is on subjectivity--as in the [measurement of persons' attitudes in a] gay rights study--methods of impression [e.g., Q-technique] are indicated" (McKeown & Thomas, 1988, p. 23).

Comparison with Multidimensional Scaling Analysis

Multidimensional scaling analysis is yet another useful methodological technique for discovering individual differences that affect persons' responses to psychometric items: "Multidimensional scaling generates a pictorial [i.e., graphic] representation of a set of variables as points in space so that the distances between every pair of points

correspond as closely as possible to the original pairwise similarities" (Berven & Scofield, 1982, p. 300). Using matrices of similarity (or dissimilarity), the procedure generates a "map" of the dimensions which underlie a given set of items. Quite often these dimensions reflect differences in the nature of persons included in the sample and, therefore, represent clusters of individuals in a sample who share similar traits or characteristics. (See, for example, studies presented by Young and Hamer, 1987, Reynolds, 1981, and Daniel and Tucker, 1993.)

Similarly, Q-methodology may also yield graphic depictions of results: each pair of Q-factors may be compared by graphing the data points defining the factors into two-dimensional space (Stephenson, 1953). However, the graphic representations of the data based on the two techniques yield different kinds of information about the relationships among the items and/or people under study. As previously noted, a major difference is that multidimensional scaling analysis yields evidence useful in defining the dimensions or latent traits that underlie the data (Jones, Sabers, & Trosset, 1987), while Q-methodology yields prototypic clusters of individuals who respond consistently across a given set of items.

Comparison with Thurstone Scaling

Thurstone and Chave (1929) pioneered what has come to be known as the "Thurstone stimulus centered scaling method," a procedure for selecting items to be included in a given behavioral measure. As described by Dawis (1987, p. 483), the Thurstone method usually includes the following steps: (1) A large pool of statements

addressing the components of a construct is developed. (2) A panel of judges is selected. These judges are asked to sort the statements into logical categories based on the underlying measurement dimensions inherent to the construct. Scale values of one to 11 are typically assigned to the items. (3) Descriptive statistics are computed for each item and the two or three items with the lowest variability across the judges' responses are selected to represent the scale points, usually for a total of 22 items. (4) The instrument is then substantively applied to a sample of representative subjects in order to compute scale scores for the construct.

Q-methodology shares many characteristics with the early Thurstone scaling method. However, it is important to note that there is a major distinction between the predominance of descriptive statistics as a means for determining clustering of responses in the case of Thurstone scaling as opposed to the use of factor analytic procedures in the case of Q. Hence, Q-methodology is not as subject to biases resulting from atypically high or low ranking of items across subjects, since factor analysis takes into consideration correlations among factored entities, rather than the absolute degree of variability across individual entities. Consequently, the Thurstone method has become rather outmoded, giving way to factor analysis and other data reduction methodologies. Not surprisingly, in comparing the two procedures, Dawis (1987, p. 483) has observed, "The Thurstone method, although a historic methodological breakthrough, has not found much favor with scale constructors. . . . Much better known is its derivative, the Q sort."

Comparison with F-Sort Procedures

The F-sort is a particular application of a family of methodological techniques known as "categorization methodology" (Miller, Baker, Clase, Conry, Conry, Pratt, Sheets, Wiley, & Wolfe, 1967). Although F-sorting is somewhat similar to Q, the two methods are inherently different in several ways. As noted by Miller, Wiley, and Wolfe (1986, p. 136):

> The term F sort has been coined following the format of the term Q sort (see Stephenson, 1953). F sort as a data collection technique was developed independently of Q sort and is quite dissimilar methodologically, since Q sort involves assigning stimulus items to fixed categories ordered along a predefined dimension while F sort is a free-sorting technique the end result of which is a set of stimulus categories completely defined by the sorter.

Hence, F-sort varies procedurally from Q-methodology predominately in the degree of freedom allowed the sorter.

In conducting an F categorical analysis, the F-sorters are given a series of K stimuli presented on cards along with blank cards which the sorters may use to describe the categories in which the cards are sorted. As Olivarez, Willson, & Kulikovich (1990, p. 2) have noted, "Unlike objective tests, the individual may group cards in any manner that makes sense to him/her rather than being directed to select a single response from a series of alternatives across a number of items." A K by K similarity matrix is then produced for each sorter, with an entry of 1 assigned to a given cell if the pair of items

were sorted together and an entry of 0 assigned if the two items were not sorted into the same category. Latent partition analysis is then used to assess the nature of the latent categories, yielding results not unlike those obtained in a multidimensional scaling analysis. Thus, while Q is useful in developing prototypes of persons across items sorted on a fixed continuum, F is appropriate for determining how individuals sort items.

Q-Methodology As Art and Science

Based on theoretically driven assumptions and computed using complex factor analytic procedures, Q-analysis serves as a fine example of the science of research; however, its focus on small samples, intraindividual attitudes, and the researcher's creativity in identifying the emergent person factors yielded by the analysis make it a highly artistic technique as well. Hence, in describing Q-methodology, researchers have focused on both the artistic and scientific elements of the technique. For example, regarding the scientific elements of Q-methodology, Cowley (1985, p. 131) has observed, "Q-analysis is based on the mathematics of set theory and adheres to the Aristotelian concepts of inter-related parts and holism. . . . As opposed to reductionism in analysis of data and the associated reliance on statistical probabilities, Q-analysis provides an organismic approach by taking the complete set of data." As to its artistic side, Kerlinger (1986, p. 518) has asserted that "Q seems to be helpful in turning up new ideas, new hypotheses. . . . One gets the feeling of a curious mind turning up interesting ideas while working with Q. . . . One can start to get an empirical purchase on slippery problems like the abstractness of attitudes and values."

Q-Methodology As Art

Stephenson frequently celebrated the intuitive side of science, i.e., those aspects of inquiry based on curiosity, inquisitiveness, and creativity. For example, Stephenson (1953, p. 51) observed:

> There is a tendency nowadays to regard experimentation in psychology as a sort of chess game, in which rules are postulated, deductions drawn, and the logic put to empirical test. Our instincts are against such an attitude. The situations in psychology . . . call for an attitude of curiosity, as well as one of hypothetico-deductive logic. A somewhat detached, but inquiring, attitude is called for, in which one seeks to learn more about the intrinsic empirical possibilities rather than the purely logical, deductive, or carefully reasoned ones. (emphasis in original)

This attitude is frequently reflected in Stephenson's explanations of Q-methodology. For example, Stephenson often spoke of the process of "quantumization" inherent to the factor analytic aspects of Q as merely the vehicle for directing the researcher to the "essences" of human subjectivity that make Q-analysis meaningful as a research tool, even using links to literary themes and devices to substantiate his points (e.g., Stephenson, 1988, 1991). Similarly, Aitken and Palmer (1988) discussed the artistry of selecting and wording items to include in a Q-sample, stressing the importance of items that evoke imagery and meaning. Moreover, in discussing how he developed his ideas regarding experimental aesthetics, Stephenson (1991, pp. 137-138) quipped:

> I made myself master of aesthetics by distinguishing between pain as sensory, and unpleasure as subjective. To "tickle" a person can be experienced as pleasure or pain; and to "prick" or "pinch" may be likewise pain or pleasure--indeed there are people who enjoy a whipping. But pleasure and unpleasure seemed of primary significance. . . . It was in this context, as well as that of psychophysics upon which it was based, that Q-technique took form. There was no thought that a conscious "mind" was at work, painting a coat of consciousness upon the phenomena of pleasure-unpleasure. Instead, there was a person, interacting with objects, with music, art, and indeed with everything of life. (emphasis in original)

Certainly artists are not bound to a single view of the world about them. The Q-artist is no exception. Various researchers have found interesting and creative ways to modify basic Q-methodology procedures. As previously, noted, Thompson (1980b, 1981) developed innovative ways for collecting Q-methodology data. Stone and Green (1971) utilized the "double Q-sort" in which they had students sort items relative to their perceptions of a professional curriculum in a nursing program in terms of "the way it is" and, separately, in terms of "the way they'd like it to be," with the two analyses yielding somewhat different portraits of reality. Similarly, Stephenson (1988) noted that multiple Q-sorts performed by the same individual relative to different aspects of a given event result in "a ghost field of quantumization" (p. 240). By the same token, however, Stephenson (1953, p. 338) rather realistically acknowledged that Q was no

methodological panacea, that it was not to be regarded as "an open sesame to all manner of remarkable discoveries."

Q-Methodology As Science

Stephenson (1953) also believed strongly in the scientific bases of Q-methodology, noting, for example, "'Q-methodology' . . . is a set of statistical, philosophy-of-science, and psychological principles which, we believe, is such as is demanded by the present scientific situation in the psychological and social sciences" (p. 1). Consequently, Q-methodology has been described as "a flexible and useful tool in the armamentarium of the psychological and educational investigator" (Kerlinger, 1986, p. 517). It is valuable for testing theories about persons, for conducting experiments about differences in people, and for defining psychological types (Stephenson, 1953). Moreover, McKeown and Thomas (1988) discuss Q's relevancy to single-subject research, and Kerlinger (1986) suggests how Q can be used to test the effects of independent variables on dependent variables.

Stephenson notes further that Q follows all the "usual rules of scientific procedure":

> We distinguish between synthetic and analytic propositions, between general and singular testable propositions, and between "general theoretic" propositions and singular testable ones. Our concern is with synthetic propositions which are either accepted or not on empirical grounds. (Stephenson, 1953, p. 342--emphasis in original)

As suggested by McKeown and Thomas (1988, p. 9), "Q is a methodology, and it is within this larger methodological framework that the significance of Q-sorting--the technical component of an inclusive logic of inquiry--is best understood." Thus, Q can be considered as a scientific procedure designed to provide "an objective way to investigate subjectivity," a facet of scientific understanding largely ignored by the "reigning objectivism" of science (Stephenson, 1988, p. 205).

As is true with most methodological procedures, Q-methodology lends itself to experimentation. For example, Mangan and Paisey (1987) have experimented with higher order factor analysis using Q-methodology data. Kerlinger (1986) demonstrated how two-way factorial Q-sorting may be conducted, using a logic similar to that of analysis of variance. Furthermore, McKeown and Thomas (1988, pp. 40-41) suggested the usefulness of the technique in studies of "intensive person samples," i.e., analyses in which subjects identified as most closely representing a prototype are probed further with a variety of methods in order to clarify the differences that exist among persons of various cohort groups.

As a scientific procedure, Q-methodology has not been without its staunch defenders (e.g., Aitken, 1988; Brown, 1986; Carr, 1992), despite the fact that to many it has retained "a somewhat fugitive status within the larger social scientific community" (McKeown & Thomas, 1988, p. 11). For example, Cattell (1978, pp. 325-327) lamented the "misspent youth of Q technique," emphasizing common problems in sampling procedures and misinterpretations of Q-technique results. Kerlinger (1986, p. 518) overviewed several aspects of Q-methodology that have often caused controversy in the

scientific community, focusing particularly on the ipsative nature of Q data collection procedures:

> Q has been adversely criticized, mostly on statistical grounds. Remember that most statistical tests assume independence. . . . In Q the placement of one card somewhere on the continuum should not affect the placement of other cards. . . . Q is an ipsative, forced-choice procedure, and it will be recalled that such procedures violate the independence assumptions: the placement of one Q card affects the placement of other cards. It is, after all, a rank-order method.

Despite these and other criticisms often lodged against Q-methodology, Q remains as a viable research procedure, with more than 1,500 studies employing Q-methodology found in the social science literature as of 1986 (Brown, 1986). Block (1961, p. 123), a scholar in the field of personality assessment, extolled the value of Q-methodology as a tool in social science research, focusing particularly on the pioneering contributions of William Stephenson:

> Stephenson, of course, innovated a methodology. His more important service, though, probably has been to insist stubbornly on the possibilities and fruitfulness of quantifying the individual case. By recognizing the different kinds of lawfulness available from variable-centered and from person-centered data, he was able to come forward with a methodology and analytical orientation which has meshed excitingly with the research needs of the students of personality.

Indeed, students of many other disciplines have also benefitted from Stephenson's contribution of Q-methodology.

Summary

In the foregoing remarks, Q-methodology has been briefly explained, comparisons of Q-methodology with other similar methods have been offered, and elements of Q-methodology that qualify it as both art and science have been reviewed. Q continues to offer to social science researchers a viable method for investigating the science of subjectivity. As Kerlinger (1986, p. 521) noted, "Q-methodology has a valuable contribution to make to behavioral research . . . perhaps mainly in opening up new areas of research. . . . [Through Q-methodology] one explores unknown and unfamiliar areas and variables for their identity, their interrelations, and their functioning."

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Figure 1
Example of Unnumbered Graphic Scale Response Format

Students in my school make good grades.

(This response indicates that most students in the respondent's school make good grades.)